Amendments to the Drawings:

In Fig. 6 the air gap 19, which was previously labeled incorrectly as element 22, has been relabeled.

Attachments: One (1) replacement drawing sheet including Figures 6 and 7

REMARKS

In the Office Action dated May 26, 2005, the Examiner rejects claims 19 and 42 under 35 U.S.C. § 112, second paragraph. The Examiner rejects claims 1-3, 7, 8, 17, 23-25, 34, 35 and 39 under 35 U.S.C. § 102(e) and rejects claims 1, 4-6, 10, 12, 13, 20-23, 26, 28, 29, 32, 33 and 43-45 under 35 U.S.C. § 102(b). The Examiner rejects claims 1, 2, 9, 11, 16, 23, 27 and 36-38 under 35 U.S.C. § 103(a). Finally, the Examiner indicates that claims 14, 15, 18, 19, 30, 31 and 40-42 contain allowable subject matter. With this Amendment, claims 1, 14, 19, 23 and 42 have been amended. No claims have been added or canceled. After entry of this Amendment, claims 1-45 are pending in the Application. It is respectfully submitted that each of the claims is allowable over the prior art of record. Reconsideration of the Application as amended is respectfully requested.

Applicants have made a number of changes throughout the specification to correct certain typographical and grammatical errors throughout. It is respectfully submitted that these changes add no new matter to the Application as filed.

Applicants have also added a priority claim to the specification to indicate that this Application is a continuation-in-part of co-pending application S.N. 10/356,347 filed January 31, 2003 by Bruno P.B. Lequesne, Avoki M. Omekanda and Thaddeus Schroeder, which was published on August 5, 2004 as Publication Number US2004/0150393 A1. Since this Application was filed under 35 U.S.C. § 111(a) and this reference has not been submitted within the time period specified by 37 C.F.R. § 1.78(a)(2)(ii), Applicants have concurrently submitted a Petition to Accept an Unintentionally Delayed Claim Under 35 U.S.C. § 120 as provided by 37 C.F.R. § 1.78(a)(3).

Entry of these proposed changes to the specification is respectfully requested.

In addition to the changes to the specification noted above, Applicants have also corrected Figure 6 to properly label the air gap 19. It is respectfully submitted that this change to Figure 6 merely conforms that drawing figure to the

specification and adds no new subject matter to the Application as originally filed. The Examiner's approval of the proposed drawing sheet incorporating Figs. 6 and 7 is respectfully requested.

Applicants gratefully acknowledge the Examiner's indication that claims 14, 15, 18, 19, 30, 31 and 40-42 include allowable subject matter. Claim 14 has been amended to independent form to include all the features of claims 1 and 12 as originally filed. Claims 14 and 15 are thus in suitable condition for allowance. The remaining claims remain dependent upon either claim 1 or claim 23, each of which is allowable as discussed in more detail below. Therefore, they have not been amended to independent form. It is respectfully submitted that each is in suitable condition for allowance.

The Examiner rejects claims 19 and 42 under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. More specifically, the Examiner states that it is unclear how one of the first set of sensing elements and one of the second set of sensing elements can be measuring one of the highest and lowest of the magnetic flux values. The Examiner further states that the claims each require two sensors for such measurement so that they are missing some feature or method step to indicate how two sensing elements can be the sensor measuring either the highest or lowest voltage.

It is respectfully submitted that neither claim requires separate and distinct sets of sensing elements. Each claim requires that one of the three sequential magnetic flux density values V_1, V_2, V_3 and one of the three sequential magnetic flux density values V_4, V_5, V_6 are the same point, i.e., one of a highest and a lowest of the magnetic flux density values measured by the second circuit. Thus, the claim requires that the sensing elements that are numbered j_1, j_2, j_3 and those that are numbered j_4, j_5, j_6 overlap by at least one sensing element. This is implicit in claims 19 and 42 as filed and is supported by the specification at least at paragraph [0039] and has been added to each of claims 19 and 42 explicitly for clarification. It is respectfully submitted that claims 19 and 42 are clear and definite and meet the

requirements of 35 U.S.C. § 112, second paragraph. Withdrawal of the Examiner's rejections of claims 19 and 42 under U.S.C. § 112, second paragraph, is respectfully requested.

The Examiner rejects claims 1-3, 7, 8, 17, 23-25, 34, 35 and 39 under 35 U.S.C. § 102(e) as being anticipated by Lequesne et al. (US 2004/0150393 A1). The instant Application is a continuation-in-part of the publication, and the subject matter of the present invention was not invented by another. To facilitate prosecution, however, Applicants have amended independent claim 1 and claim 23 to clarify that the linear array has at least three galvanomagnetic sensing elements. In addition, each claim has been amended to state the feature wherein a width of the target moving adjacent the surface of the linear array is equal to or narrower than a distance between adjacent sensing elements as described in paragraph [0033] of the specification. It is respectfully submitted that this latter feature is neither taught nor suggested by Lequesne et al. In addition, claims 1 and 23 have been reordered to clarify the magnetic flux density curve by stating that the curve comprises a magnetic flux density value at each of the sensing elements. It is respectfully submitted that claim 1 and its dependent claims 2, 3, 7, 8 and 17 and claim 23 and its dependent claims 24, 25, 34, 35 and 39 are allowable over the prior art of record.

The Examiner rejects claims 1, 4, 20, 21, 23 and 44 under 35 U.S.C. § 102(b) as being anticipated by Honda (US 5,327,077). Initially, it is submitted that Honda is one example of a prior art differential sensor described in the instant Application. Thus, there are many differences between the instant invention and Honda. Among other things, while the Examiner states that that gear 3 is shaped so that a magnetic flux density curve resulting from excitation of the sensing elements includes at least one of a peak and a valley, nothing in Honda teaches or suggests that the magnetic flux density curve comprises a magnetic flux density value at each of the sensing elements such that least one of a maximum of the peak and a minimum of the valley indicates one of the linear position and the angular position of the device. Honda operates quite differently in that each MR provides input to a phase detection circuit, and the outputs of these circuits are manipulated to provide angular position.

In addition, it is respectfully submitted that Honda neither teaches nor suggests the feature of independent claims 1 and 23 wherein a width of the target moving adjacent the surface of the linear array is equal to or narrower than a distance between adjacent sensing elements. This is not a mere shape or size difference; the inclusion of this feature in Honda would change the waveforms resulting at each sensing element in a manner not contemplated by Honda. For this, and other reasons, claims 1 and 23 and their dependent claims 4, 20, 21, 23 and 44 are allowable over Honda.

In addition to its dependence from allowable claim 1, claim 4 recites independently patentable features therein. Citing Figure 8, the Examiner states that Honda discloses multiple target teeth and the spacing between the teeth is equal to or less than half the distance between the first and last sensor elements. However, Honda does not describe the feature wherein the target spacing (spacing between two magnetic teeth or two magnetic slots) is one of equal to and less than half of a distance between a first galvanomagnetic sensing element and a last galvanomagnetic sensing element of the linear array, and Figure 8 of Honda does not illustrate the feature in that it is not necessarily to scale. The invention of claim 4 is patentable over Honda.

The Examiner states that the apparatus of Honda anticipates claims 21 and 44 because that apparatus determines position based upon the minimums and/or maximums measured in the response signals retrieved from the detector arrays. Applicants respectfully submit that even if this were an accurate representation of the teachings of Honda, Honda still fails to teach or suggest the features in each of claims 21 and 44. More specifically, the claims describe detection of one of a presence and an absence of a minimum of the magnetic flux density curve wherein when the presence of the minimum is detected, the location of the maximum and the location of the minimum indicate the linear position of the device; and wherein when the absence of the minimum is detected, the location of the maximum and the absence of the minimum indicates the linear position of the device. It is respectfully submitted that the Examiner has failed to point to these features in the reference because he

cannot. Claims 21 and 44 are allowable over the prior art of record for this reason and because of their dependence from allowable claims 1 and 23.

The Examiner rejects claims 1, 5, 23 and 32 under 35 U.S.C. § 102(b) as being anticipated by Von Borcke (US 3,934,160). It is respectfully submitted that Von Borcke does not teach or suggest the features of claims 1 and 23 wherein the target is shaped so that a magnetic flux density curve resulting from excitation of the sensing elements includes at least one of a peak and a valley and wherein at least one of a maximum of the peak and a minimum of the valley indicates one of the linear position and the angular position of the device. Von Borcke is instead directed to the goal of extending the linear range of a sensor. More particularly, Von Borcke teaches a position sensor with two field plates 4, 4' over which an iron part 6 is moved. The resulting electrical resistance of the field plates changes as a function of an applied magnetic field. (Abstract). A single output voltage is produced such that it is zero in the center of the linearity zone corresponding to the path e in Fig. 2 or the path g in Fig. 3. The position of the iron member 6 is indicated by how far the resulting output voltage is from zero and in which direction. (Col. 2, line 66 to col. 3, line 7). No peak or valley is needed or desirable and the position would not be indicated by at least one of a maximum of the peak and a minimum of the valley because this would, by definition, be outside the linear zone of Von Borcke's sensor.

In addition, Von Borcke fails to describe a linear array with at least three galvanomagnetic sensing elements. Von Borcke illustrates only two field plates 4 and 4' and fails to describe, sufficient to one skilled in the art, how a sensor with additional field plates would work and how it would be constructed. Finally, Von Borcke describes, as one of the features that allows the expansion of the linear range of the sensor, the feature whereby the iron member 6 completely covers one field plate while the other plate is not covered, (Abstract, Figs. 1 and 3), and describes one embodiment where the width *f* of the iron member 6 is equivalent to the width *a* of a field plate 4 or 4' and the space *c* between the field plates, (col. 2, ll. 59-65). Thus, Von Borcke fails to teach or suggest the feature of claims 1 and 23 wherein a width

of the target moving adjacent the surface of the linear array is equal to or narrower than a distance between adjacent sensing elements.

For all of the foregoing reasons, claims 1, 5, 23 and 32 are allowable over Von Borcke.

The Examiner has also failed to show that Von Borcke teaches or suggests all the features of claims 5 and 32. The Examiner states that Von Borcke discloses the target position at an angle to the direction of displacement such that the range of the sensor is equal to a distance between the first and last sensing element of the linear array divided by the sine of the angle. Applicants concur that Von Borcke discloses that the iron member 6 is positioned at a fixed angle with respect to its direction of displacement. However, it does not follow that a range of the sensor is equal to a distance between the field plate 4 and the field plate 4' divided by the sine of the angle. In fact, the range of the sensor is likely to be considerably smaller that this because Von Borcke operates only in the linear range of the output. Thus, it is respectfully submitted that claims 5 and 32 are allowable for this reason and based upon their dependence from allowable independent claims 1 and 23.

The Examiner rejects claims 1, 6, 10, 12, 13, 23, 26, 28, 29 and 33 under 35 U.S.C. § 102(b) as being anticipated by Hini (US 4,041,371). Like Honda, Hini illustrates a prior art sensor using differential signals and thus it differs in many ways from the instant invention. It is respectfully submitted that Hini neither teaches nor suggests the feature of independent claims 1 and 23 wherein a width of the target moving adjacent the surface of the linear array is equal to or narrower than a distance between adjacent sensing elements. Hini, in fact, uses an example whereby the width *a* of the field plates 6 and 8 and the spacing *b* between the two plates are chosen so that the sum of the width and the spacing is equal to the width *c* of the control element 4. (Col. 2, ll. 20-23). This is presumably done to maximize the benefit whereby the control element 4 shifts flux of the magnet from one plate to the other such that the resistance of the two plates 6 and 8 change in opposite directions. (Col. 1, ll. 45-58; col. 2, ll. 12-17). Hini also fails to teach or suggest the use of a linear array having at least three galvanomagnetic sensing elements. The differential

sensing of Hini requires only two field plates and fails to describe how such a sensor configuration would work with more than two field plates. Hini also fails to teach or suggest the features of claims 1 and 23 wherein the target is shaped so that a magnetic flux density curve resulting from excitation of the sensing elements includes at least one of a peak and a valley, the magnetic flux density curve comprising a magnetic flux density value at each of the sensing elements wherein at least one of a maximum of the peak and a minimum of the valley indicates one of the linear position and the angular position of the device. Hini determines the angular position by comparing the measured resistance values of the two field plates. For these reasons, and others, claims 1 and 23 and their dependent claims 6, 10, 12, 13, 26, 28, 29 and 33 are allowable over Hini.

The Examiner states, with respect to claims 13 and 29, that Hini discloses the recited relationship of $R(\beta)$ because the equation is merely a property of the device disclosed in Hini. It is respectfully submitted that when the Examiner is relying upon inherency, as here, that it is insufficient to rely upon a possibility. There are sufficient differences between the device taught by Hini and the subject invention that it is not a certainty that the recited relationship would be inherent to the device taught by Hini. For these reasons, and based upon dependency from allowable claims 1 and 23, respectively, claims 13 and 29 are allowable over Hini.

The Examiner rejects claims 1, 20, 22, 23, 43 and 45 under 35 U.S.C. § 102(b) as being anticipated by Van Antwerp et al. (US 4,737,710). It is respectfully submitted that Van Antwerp et al. neither teaches nor suggests the feature of independent claims 1 and 23 wherein a width of the target moving adjacent the surface of the linear array is equal to or narrower than a distance between adjacent sensing elements. In addition, it fails to teach or suggest the features of claims 1 and 23 wherein the target is shaped so that a magnetic flux density curve resulting from excitation of the sensing elements includes at least one of a peak and a valley, the magnetic flux density curve comprising a magnetic flux density value at each of the sensing elements wherein at least one of a maximum of the peak and a minimum of the valley indicates one of the linear position and the angular position of

the device. The signals of Figures 5-8 are based upon output signals calculated from combining individual device's signal output and upon further manipulating certain of the signals to derive others as described at col. 7, line 20 to col. 8, line 9. Thus, the invention as defined by each of claims 1, 20, 22, 23, 43 and 45 is patentable over Van Antwerp et al.

Regarding claims 22 and 45, the Examiner states that Van Antwerp et al. discloses that position is determined based upon minimums and/or maximums measured in the response signals received from its detector arrays. Applicants respectfully submit that even if this were an accurate representation of the teachings of Van Antwerp et al., Van Antwerp et al.still fails to teach or suggest the features in each of claims 22 and 45. More specifically, the claims describe detection of one of a presence and an absence of a minimum of the magnetic flux density curve wherein when the presence of the maximum is detected, the location of the minimum and the location of the maximum indicate the linear position of the device; and wherein when the absence of the maximum is detected, the location of the minimum and the absence of the maximum indicates the linear position of the device. It is respectfully submitted that the Examiner has failed to point to these features in the reference because he cannot. Claims 22 and 45 are allowable over the prior art of record, particularly Van Antwerp et al., for this reason and because of their dependence from allowable claims 1 and 23.

The Examiner rejects claims 1, 2, 9, 16, 23 and 36-38 under 35 U.S.C. § 103(a) as being unpatentable over Rhodes et al. (US 6,509,732) in view of Schroeder (US 6,498,482). The Examiner states that Rhodes et al. teaches all the features of claims 1, 2 and 23 except for galvanomagnetic sensing elements. According to the Examiner, Schroeder teaches using Hall or MR elements, and it would have been obvious at the time the invention was made to use such sensor because they are well known in the art for measuring magnetic fields in devices such as linear and rotary position sensors. It is respectfully submitted that Rhodes et al. fails to teach or suggest at least the feature of claims 1 and 23 wherein a width of the target moving adjacent the surface of the linear array is equal to or narrower than a

distance between adjacent sensing elements. Nothing in Rhodes et al. would lead one skilled in the art to make this modification. Since Schroeder also fails to teach or suggest this feature in combination with Rhodes et al., claims 1, 2, 9, 16, 23 and 36-38 are allowable over the proposed combination.

The Examiner rejects claims 11 and 27 under 35 U.S.C. § 103(a) as being unpatentable over Hini in view of Yamazaki et al. (EP1003040). The Examiner acknowledges that Hini does not teach an eccentricity compensation means but states that Yamazaki et al. teaches a rotary sensor with means to compensate for eccentricity of the rotor with respect to the stator. The Examiner further states that one having ordinary skill in the art would have been motivated to incorporate this into Hini so to prevent output variation whenever the rotor became off center during rotation. First, it is respectfully submitted that the addition of Yamazaki et al. to Hini fails to cure the deficiencies noted in Hini with respect to claims 1 and 23 from which claims 11 and 27 respectively depend. Thus, claims 11 and 27 are allowable by dependency from claims 1 and 23. In addition, it is submitted that the Examiner has too broadly interpreted the means-plus-function element of the eccentricity means of these claims. The eccentricity means claimed by these claims is limited to those structures that perform the recited function and their equivalents. Claims 11 and 27 depend from claims requiring the target to be one of a spiral magnetic tooth and a spiral magnetic slot rotatable about an axis. The structure used in Yamazaki et al. to eliminate spacing variations and thus measurement variations between the rotor and detecting member due to eccentricity is a supporting member for the rotor and detecting member making them movable together in the X- and Y-directions. This structure is not equivalent to any means disclosed in Applicants' invention, and, in any case, it is completely unclear whether the structure used in Yamazaki et al. would work at all with a spiral magnetic target. The invention as defined in each of claims 11 and 27 is thus patentable over the prior art of record.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the Application as originally filed. It is further submitted that this Amendment has antecedent basis in

the Application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the Application. Reconsideration of the Application as amended is requested. It is respectfully submitted that this Amendment places the Application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present Application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact Applicants' attorney at the telephone number listed below.

Respectfully submitted,

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